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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,084	11/09/2000	Akira Nishimura	360842006800	1476

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EXAMINER

WACHTEL, ALEXIS A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 09/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/700,084

Applicant(s)

NISHIMURA ET AL.

Examiner

Alexis Wachtel

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspond nce addr ss --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>Z</u> . | 6) <input type="checkbox"/> Other: |

Detailed Action

Response to Amendment

1. Applicant's amendment and accompanying Remarks filed 3-26-2003 have been entered and carefully considered. The amendment is sufficient to overcome the obviousness rejections of claims 1-25 and the 112 2nd paragraph rejections of claims 21 and 22. Applicant's arguments are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 102/103

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1,7,15, 18,19 and 25 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 5800749 to Lewit et al.

Lewit et al disclose a composite made of a reinforcing layer. A nonwoven fabric layer is attached to the reinforcing fabric layer. The reinforcing fabric is preferably a directional fabric composed of carbon fibers such as a woven (Col 2, lines 54-67). The

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reinforcing fabric is mechanically attached to the nonwoven fabric by needle punching (Col 3, lines 1-5). The nonwoven can be made of thermoplastic fiber (Col 3, lines 17-20). Per claim 25, Lewit et al discloses an identical process of impregnating the composite (Fig.7).

Regarding claims 18 and 19, although Lewit et al does not explicitly teach that the carbon fibers used in the woven fabric reinforcing layer have the claimed tensile modulus and tensile strength, that the nonwoven has the claimed void ratio and cover factor it is reasonable to presume that said limitations are inherent to the invention. Support for said presumption is found in the use of similar materials (i.e. carbon fibers, organic fiber) and in the similar production steps (i.e. weaving carbon fibers, making nonwoven fabric from organic fibers) used to produce the woven carbon fiber and nonwoven. The burden is upon the Applicant to prove otherwise. *In re Fitzgerald*, 205 USPQ 594. In the alternative, the claimed tensile modulus, tensile strength and void ratio of the nonwoven would obviously have been provided by the process disclosed by Lewit et al. Note *In re Best*, 195 USPQ 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3,8-11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5800749 to Lewit et al in view of US 2002/0193030 A1 to Yao et al.

Lewit et al fails to teach that the nonwoven itself functions as a consolidating mechanism by including 5 to 50% by weight of low-melting point fibers in the nonwoven so that the nonwoven and woven can be consolidated by heat bonding. Yao et al discloses that nonwoven fabrics can be made of bicomponent fibers that when heated causes the bicomponent fibers to fuse (pp.1, [0004]). Additionally, Yao et al teaches that a desirable bicomponent fiber can have a core of nylon 6 and a sheath of nylon copolymer (pp.1 [0012]). Since bicomponent fibers are disclosed by Yao et al as having adhesive properties, it would have been obvious to one of ordinary skill to have employed bicomponent fibers as set forth above in the nonwoven disclosed by Lewit et al motivated by the desire to improve the structural resilience of the nonwoven/woven reinforcement composite by improving the bond between nonwoven and woven. Although Yao et al fails to teach the amount of low-melting point fibers present, having employed the claimed range would have been necessitated by the desire to optimize the strength and flexibility of the nonwoven and its effect on the structural characteristics of the woven layer it is consolidated with. Additionally, having employed the claimed cross section of the core to the whole bicomponent fiber would have been obvious since too great of an amount of low melting point sheath material would result with an inflexible nonwoven whereas too much core material would result with a nonwoven of inferior strength.

The references as set forth above fail to teach the claimed basis weight on the nonwoven. Having chosen the claimed basis weight would have depended on the desired strength and flexibility of the resultant composite. Adjusting the basis weight of the nonwoven would have affected these two properties and having determined the desirable basis weight would have been accomplished through routine experimentation.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5800749 to Lewit et al in view of US 2002/0123288 A1 to Davies et al.

Although Lewit et al enables for the use of adhesives to consolidate the nonwoven and woven fabric layer (Col 3, lines 1-4), Lewit et al fails to teach the use of a pressure sensitive adhesive to consolidate the nonwoven and woven fabric layers. Yao et al teaches that composites can be consolidated by pressure sensitive adhesives. Since pressure sensitive adhesives are identified as equivalently suitable for composite consolidation, it would have been obvious to one of ordinary skill to at the time the invention was made to have employed pressure sensitive adhesive as the consolidation mechanism. One of ordinary skill would have been motivated by the desire to make use of an adhesive that is either cost effective or more available.

8. Claims 4 and 5 and are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5800749 to Lewit et al.

Lewit et al fails to teach the claimed fiber size and number of filaments per reinforcing fiber. Since it is well established in the composite art that the tenacity of carbon fibers can be adjusted by varying the number of total carbon filaments thus affecting carbon fiber size, having selected the number of carbon filaments and fibers

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would have been obvious to one of ordinary skill at the time the invention was made.

One of ordinary skill would have been motivated by the desire to obtain an application specific fiber strength.

9. Claims 6,12,13,14, 16, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5800749 to Lewit et al in view of US 4906506 to Nishimura et al.

Per claim 6, Lewit et al fails to teach the basis weight of the carbon fiber woven reinforcing fabric. Nishimura et al is directed to fiber reinforced plastics and teaches that a desirable basis weight for a woven fabric substrate used in a fiber reinforced plastic composite is 60 to 700g/m². If the basis weight is less than 60g/m², production slows down due to the need for many such woven fabric layers to obtain the required fabric thickness. Conversely, using a basis weight of greater than 700 g/m² will result with excess crimp in the weaving yarns (Col 4, lines 30-38). In view of this teaching it would have been obvious to one of ordinary skill at the time the invention was made to have employed a basis weight of 60-700g/m² for the carbon fiber woven reinforcing fabric disclosed by Lewit et al. One of ordinary skill would have been motivated by the desire to improve manufacturing efficiency as well as improve the durability of the composite resulting from the consolidated woven and nonwoven.

Per claims 6,12 and 13 Lewit et al fails to teach the basis weight of the carbon fiber woven reinforcing fabric, that a unidirectional fabric is used that has carbon fiber yarns oriented in a length direction of the material, and auxiliary yarns thinner than the carbon fiber yarns and oriented in a width direction to form a woven structure.

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Nishimura et al discloses an FRP made of a plurality of sheet-like substrates, at least one of the adjacent substrates being a woven fabric (Col 3, lines 25-33). The woven fabric can be a sheet whereby the reinforcing yarns are unidirectional with auxiliary yarns 603b intersecting reinforcing yarns 406 (Fig. 86). Such a woven fabric substrate can have a basis weight of 60 to 700 g/m² (Col 4, lines 30-38). Since Nishimura et al has disclosed that woven carbon fiber layers are employed in composites, it would have been obvious to one of ordinary skill to have employed the woven fabric disclosed by Nishimura et al with the specified basis weight instead of the woven carbon fiber reinforcing fabric layer disclosed by Lewit et al. One of ordinary skill would have been motivated by the desire to use a structurally more resilient woven fabric layer.

In regards to claims 14 and 16, although the references as set forth above fail to teach that carbon fiber yarns are oriented in the length direction as intervals of 0.1 to 1.0mm, it would have been obvious to have done so, Too great of an interval would result with a spatially unstable fabric whereas too small of an interval would result with an exceedingly inflexible fabric poorly suited for molding applications. Additionally, a carbon fiber that is too wide or too thick is not easily processed into fabric form, whereas if it is too thin and narrow the requisite structural resilience would not have been realized. Thus one of ordinary skill would have determined the desired interval, carbon fiber thickness and width through the process of routine experimentation.

Per claim 21, Lewit et al fails to teach a composite comprising a plurality of woven and nonwoven layers such that the woven and nonwoven layers are located alternately.

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Nishimura et al teaches that alternating layers of woven and nonwoven are known (Col 2, lines 41-42). Since alternating composite layers results with a composite having uniform structural properties, having arranged a plurality of woven and nonwoven layers in an alternating fashion would have been obvious to one of ordinary skill in the art.

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5800749 to Lewit et al in view of US 5316462 to Seemann. Lewit et al fails to teach that the method of claim 24 is used to impregnate the nonwoven/woven composite.

Seemann teaches the use of vacuum bagging for impregnating composite layers (Col 1, lines 31-53). Since vacuum bagging is a well known technique used for molding composite parts, having used vacuum bagging would have been obvious to one of ordinary skill in the art as evidenced by its equivalent suitability for molding whereby its use would have been motivated by the desire to use a more cost effective or efficient process.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Alex Wachtel, whose number is (703)-306-0320. The Examiner can normally be reached Mondays-Fridays from 10:30am to 6:30pm.

If attempts to reach the Examiner by telephone are unsuccessful and the matter is urgent, the Examiner's supervisor, Mr. Glenn Caldarola can be reached at (703) 308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



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